

AMENDMENTS TO THE DRAWINGS

Please replace the drawing sheets of Figs. 1-4 with the attached Replacement Sheets.

Attachment: Replacement Sheets (4) (both a marked-up version and a clean version)

REMARKS

Claims 7-12 are all the claims pending in the application. By the present Amendment, Applicants have added new claim 12. It is respectfully submitted that the pending claims define patentable subject matter.

Statement of Substance of Interview

Applicants thank the Examiner for the Interview of June 15, 2010. During the Interview, the parties discussed the objections to the specification, the rejection of claims 7-11 under 35 U.S.C. § 112, first paragraph, and the rejections of claims 7-11 under 35 U.S.C. §§ 102 and 103 over Cammarota (and thereby Timmons by incorporation by reference).

With regard to the objections to the drawings, the parties agreed that amending the drawings so that the reference numerals for the cross-sections are denoted by Roman numerals, and amending the specification in a similar manner, should overcome the objection to the drawings. Furthermore, the parties agreed that amending the claims to include a water content indicator layer should overcome the objection of the specification relating to the claims being commensurate with the detailed description.

With regard to the rejection of the claims under 35 U.S.C. § 112, first paragraph, the parties agreed that amending the claims to include a water content indicator layer would overcome this rejection.

With regard to the rejection of the claims under 35 U.S.C. § 102, Applicants' representative argued that certain elements from one embodiment (in Cammarota) and other elements from a different embodiment (in Timmons) cannot properly be combined to form a rejection under 35 U.S.C. § 102. The Examiner disagreed.

The Examiner took the position that the binder of Timmons corresponds to the claimed hydrophilic resin coating layer and the particles dispersed therein correspond to the claimed information mark layer.

The parties discussed a possible amendment of the claims to define the resin coating layer and the information mark layer as being strata in order to clarify that these two layers are separate and distinct layers. No agreement was reached with regard to the rejections under 35 U.S.C. §§ 102 and 103.

Objections

Applicants have herein submitted Replacement Drawings, in which a number of the reference numerals that were letters have been replaced. Additionally, certain lead lines have been shown as dashed, as suggested by the Examiner. Furthermore, the specification has been amended to be consistent with the presently submitted drawings. Accordingly, reconsideration and withdrawal of the objection to the drawings are respectfully requested.

The specification is objected to due to a number of minor informalities. Applicants have herein submitted a Substitute Specification with markings showing all of the changes, and also a clean version of the Substitute Specification. No new matter has been added. The amendments to the specification are believed to overcome the objections to the specification. Thus, reconsideration and withdrawal of the objection to the specification are respectfully requested.

Claims 7-11 are objected to minor informalities. Applicants have herein amended claim 11 to overcome the objection.

Claims Rejections - 35 U.S.C. § 112

Claims 7-11 are rejected under 35 U.S.C. § 112, second paragraph as allegedly being indefinite. Applicants have amended claim 11 to provide proper antecedent basis for the side of the absorbent, and have reworded the last five lines to clarify the features therein. Furthermore, Applicants have amended claim 11 to recite a water content indicator coating layer as suggested by the Examiner during the Interview for overcoming this claim rejection. In view of the amendments, reconsideration and withdrawal of the rejection are requested.

Claims Rejections - 35 U.S.C. § 102/103

Claims 11 and 9 are rejected under 35 U.S.C. § 102(b) as alleged anticipated by, or alternatively under 35 U.S.C. § 103(a) as alleged obvious over, Cammarota et al. (U.S. 6,307,119; hereinafter "Cammarota") and thereby, by incorporation, Timmons (U.S. 4,022,211). Applicants respectfully traverse this rejection.

Initially, it is noted that the rejection under 35 U.S.C. § 102 is improper because an anticipation rejection cannot be based on merely picking and choosing multiple, distinct teachings from a single reference that could somehow be combined to arrive at the claimed invention (*see* Net MoneyIn, 545 F.3d at 1371; *see also* In re Arkley, 455 F.2d at 587).

Claim 11 recites (with emphasis added):

An absorbent article comprising, in integral formation, a liquid permeable top sheet, an absorbent, a water vapor permeable waterproof sheet, and a liquid impermeable back sheet in this order, the absorbent article further comprising:
a hydrophilic resin coating layer provided on a first portion of the water vapor permeable waterproof sheet and between the water vapor permeable waterproof sheet and the absorbent;
a water content indicator coating layer provided between the hydrophilic resin coating layer and the absorbent;
wherein a permeability of the first portion of the water vapor permeable waterproof sheet and the hydrophilic resin

coating layer is lower than a permeability of a second portion of the water vapor permeable waterproof sheet on which the hydrophilic resin coating layer is not provided on the water vapor permeable waterproof sheet.

The Examiner alleges that Cammarota discloses a liquid permeable top/upper-most sheet 42, an absorbent 44, a water vapor permeable waterproof sheet 116, and a liquid impermeable back sheet 114 in this order (Office Action, page 8). The Examiner alleges that Timmons discloses a binder which is water-soluble and that this component corresponds to the claimed hydrophilic resin coating layer. The Examiner alleges that an area in which the binder is located adds extra thickness and therefore there inherently is a lower permeability at the coated portion than at the uncoated portion due to the increased thickness (Office Action, page 10).

Cammarota discloses that the outer cover 40 can include a liquid permeable outer layer and a liquid impermeable inner layer (column 15, lines 19-21). Accordingly, the back sheet 114 of Cammarota is not a liquid impermeable back sheet.

Furthermore, Timmons merely discloses a pattern of a water soluble coloring agent which may be applied in the form of a water-soluble dye in a water-soluble polyvinyl alcohol binder (column 3, lines 2-4), or may be in the form of an aqueous dispersion in association with a water-soluble binder (column 3, lines 30-34). In other words, Timmons discloses the coloring agent particles disposed within the binder.

The Examiner takes the position that the binder corresponds to the claimed resin coating layer and that the color agent particles which are dispersed within the binder correspond to the claimed water content indicator coating layer. Applicants respectfully disagree with this position.

The dispersed particles of the coloring agent are disposed within the alleged resin coating layer and therefore cannot be “provided between the hydrophilic resin coating layer and the absorbent” (emphasis added).

Accordingly, claim 11 is patentable because Cammarota and Timmons do not disclose or suggest all of the features recited therein.

Claim 9 is patentable at least by virtue of its dependency on claim 11.

Claim 8 is rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Cammarota (and thereby Timmons).

As discussed above, Cammarota and Timmons do not disclose or suggest all of the features of claim 11. Therefore, claim 8 is patentable at least by virtue of its dependency on claim 11. Furthermore, because the binder of Timmons, i.e., the alleged resin coating layer, is the adhesive that binds the coloring agent, i.e., the alleged water content indicator coating layer, the length and width of these two alleged “layers” would be identical. That is, the binder with the coloring agent disposed therein forms one length and width.

In addition, the Examiner alleges that there is no criticality of the claimed range of 1-20 micrometers and that it would have been obvious to discover the optimum or workable range (Office Action, page 12).

However, before the Examiner can allege that it would have been obvious to optimize a variable, that particular variable must first be recognized as a result-effective variable by the prior art (M.P.E.P. § 2144.05(II)). The thickness of the binder, i.e., the alleged resin coating layer, is not mentioned or even remotely recognized in Timmons as being effective to produce a particular result, and in no way suggests that adjusting the thickness of the binder would effect the vapor permeability. The binder is used merely to adhere the coloring agent and not to adjust

or provide a particular vapor permeability. Accordingly, the Examiner's position that it would have been obvious to have optimized the thickness of the binder, i.e., the alleged resin coating layer, is improper.

Therefore, Cammarota and Timmons do not disclose or suggest the features recited in claim 8 and it is submitted that claim 8 is separately patentable over the cited art for the features recited therein.

Claim 7 is rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Cammarota (and Timmons) in view of Ikeda et al. (U.S. 2003/0148091; hereinafter "Ikeda").

Ikeda does not remedy the deficiencies of Cammarota and Timmons in that Ikeda does not disclose or suggest the claimed layers or sheets in the claimed order, or does not disclose or suggest the claimed resin coating layer.

Accordingly, claim 7 is patentable at least by virtue of its dependency on claim 11.

Claim 10 is rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Cammarota (and Timmons) in view of Kolfta et al. (U.S. 2003/0154904; hereinafter "Kolfta") and Yubuki et al. (U.S. 2002/0061595; hereinafter "Yubuki").

Neither Kolfta nor Yubuki supply the deficiencies of Cammarota and therefore claim 10 is patentable at least by virtue of its dependency on claim 11.

Added Claim

Applicants herein add claim 12 which depends from claim 11. The features of claim 12 correspond to the amendment discussed during the interview. It is submitted that claim 12 is patentable over the cited art by virtue of its dependency and for the features recited therein. No new matter has been added.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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23373

CUSTOMER NUMBER

Date: June 23, 2010

DESCRIPTION

ABSORBENT ARTICLE

Background of the Invention

1. Technical Field

This invention relates to an absorbent article such as a disposable paper diaper, a sanitary napkin or the like, and more particularly to an absorbent article provided with an indicator means capable of identifying an excretion of body fluid such as urine or the like from an outer side.

2. Background Art

~~A quality giving amenity to wearer and giving usability to user is required for an~~ An absorbent article such as a disposable paper diaper, a sanitary napkin or the like, should provide a quality giving amenity to a wearer and usability to the user.

In order to obtain the amenity, a water vapor permeable film is generally employed in this field. ~~7 and there is a tendency that the~~ The level of water vapor permeability becomes has become higher and higher from year to year. Further, in order to improve the usability, an indicator means informing the user (for example, a mother) of the excretion of the body fluid of the wearer (for example, a nursing) is in heavy usage. ~~7 and~~ As the indicator means, there has been developed a water content indicator which quickly responds with a small amount of water content ~~as the indicator means.~~

Previously, as the water content indicator provided in

the absorbent article as mentioned above, there has been generally known an absorbent article in which a display element constituted by a water based ink or paint discolored by the water content is directly applied to an inner surface (that is, a skin contact surface) side of a base material sheet constituted by an unpigmented hydrophilic paper (refer, for example, to Japanese Unexamined Patent Publication No. 9-299401), or an absorbent article in which a hydrophilic composition discolored by a change of pH on the basis of the water content is directly applied to an inner surface of a liquid impermeable back sheet (refer, for example, to Japanese Unexamined Patent Publication No. 2003-210522).

However, in the conventional absorbent article provided with the water content indicator mentioned above, for example, in the case that it is stored in a warehouse at a time of transporting, or in the case that it is displayed at the store or the like, it has been a problem that the absorbent article is exposed to the outside air and the outside light, and the water content indicator is already reacted and discolored before being used. If the water content indicator is reacted and discolored before being used as mentioned above, it is hard to identify from the outer side whether or not the excretion of body fluid is actually executed. Further, in the case that a small amount of body fluid is excreted, it is more ~~harder~~ difficult

to identify the excretion.

This invention has been made under the circumstances as described above, and its object is to provide an absorbent article which ~~removed~~ removes the defect of the absorbent article as mentioned above, which ~~prevent~~ prevents the function from decreasing even if it is exposed to the outside air and the outside light in the transportation or the storage or the like, which is provided with a high sensitive water content indicator which can immediately identify the excretion from the outer side even if it is a small amount of body fluid, ~~further and~~ which ~~give~~ gives an amenity to a wearer and ~~give a~~ usability to a user.

~~Disclosure of the Invention~~ Summary

The above object of this invention is attained by providing an absorbent article structured by integrally forming at least a liquid permeable top sheet, an absorbent, a water vapor permeable waterproof sheet, and a liquid impermeable back sheet in this order, characterized in that a water content indicator is provided on an inner surface of the water vapor permeable waterproof sheet, the water content indicator being constituted by a hydrophilic resin coating layer and an information mark provided on an inner surface of the hydrophilic resin coating layer.

The above object of this invention is more effectively attained by providing an absorbent article characterized in that the water vapor permeable waterproof sheet is constituted by a sheet material in which a water vapor permeability on the basis

of JIS Z-0208 method of test is 700 g/m²/24h or more.

The above object of this invention is more effectively attained by providing an absorbent article characterized in that the hydrophilic resin coating layer constituting the water content indicator and the information mark are formed in approximately same shape.

Moreover, the above object of this invention is effectively attained by providing an absorbent article characterized in that a print surface by a general ink is provided at a position corresponding to the information mark between the water vapor permeable waterproof sheet and the hydrophilic resin coating layer.

~~Effect of this Invention~~

As mentioned above, the absorbent article of this invention is provided with the water content indicator constituted by the hydrophilic resin coating layer having a moisture resistance on the inner surface of the waterproof sheet having the high water vapor permeability, and the information mark formed on the inner surface of the hydrophilic resin coating layer. Therefore, according to the absorbent article of this invention, a stuffy state is not generated even if the wearer has the absorbent article on, owing to the water vapor permeable waterproof sheet having the high water vapor permeability, whereby it is possible to give the amenity to the wearer. Further, since the provided water content indicator has the moisture resistance, the function of the water content indicator is not deteriorated by the humidity

of the outside air. Furthermore, since the water content indicator has the high sensitivity, there can be provided with the absorbent article having a very high usability for the user, that the water content indicator is rapidly reacted and changed by the body fluid even if the amount of excretion of the body fluid is extremely small, whereby it is possible to immediately inform the user of the excretion.

In this case, the moisture resistance in this invention means that the water vapor permeability, which the waterproof sheet essentially has, ~~lower~~ is lowered by coating the resin on the waterproof sheet, in the case that the water vapor permeability is measured on the basis of JIS Z-0208 method of test. In accordance with experiment of this inventor, if PVA resin of 10 μ m is coated on the waterproof sheet which the water vapor permeability is 9000 g/m²/24h, it appears that the water vapor permeability ~~lower~~ is lowered to 1500 g/m²/24h. As described later, it is preferable that the water vapor permeable waterproof sheet is constituted by a sheet material in which the water vapor permeability on the basis of JIS Z-0208 method of test is 700 g/m²/24h or more, particularly 7000 g/m²/24h or more. Further, in accordance with this absorbent article on the basis of the structure mentioned above, there is obtained a pronounced effect that the water content indicator is reacted and changed for an extremely short time within 10 second, even in the case that a small amount, for example, 10 cc of urine is excreted.

Brief Description of the Drawings

Fig. 1 is an expansion plan view of a disposable paper diaper in accordance with a first embodiment of this invention.

Fig. 2 is a sectional view taken along the line ~~X-X~~I-I of Fig. 1.

Fig. 3 is a sectional view taken along the line ~~Y-Y~~II-II of Fig. 1.

Fig. 4 is an enlarged cross sectional view of the main portion of the first embodiment.

Fig. 5 is a plan view of the main portion of the first embodiment.

Fig. 6 is a plan view of the main portion of the second embodiment in accordance with this invention.

Fig. 7 is a plan view of the main portion of the third embodiment in accordance with this invention.

Fig. 8 is a sectional view taken along the line ~~Z-Z~~III-III of Fig. 7.

~~Best Mode of Carrying Out the Invention~~Detailed Description of the Exemplary Embodiments

A description will be in detail given below of contents of this invention by exemplifying a case that an absorbent article is constituted by a disposable paper diaper. In this case, it is needless to say that this invention is not necessarily limited to this example, but that variations may be made without departing

from the scope of claims.

Fig. 1 shows a first embodiment of this invention, and it is a plan view in the case of expanding a pants type disposable paper diaper (hereinafter, refer to as "present paper diaper") 100 and viewing it from a front face side, Fig. 2 is a sectional view taken along the line ~~X-XI-I~~ of Fig. 1, and Fig. 3 is a sectional view taken along the line ~~Y-VII-II~~ of Fig. 1.

The present paper diaper 100 is formed by adhering and fixing an absorbent main body 10 integrated by adhering a rectangular liquid permeable top sheet 11, an absorbing element ~~AB-41~~ formed by covering a sandglass-shaped absorbent 13 with a crepe paper 14, a rectangular water vapor permeable waterproof sheet 15, and a liquid impermeable back sheet 12 by a hot melt adhesive agent or the like in this order (reference sign * in the drawing denotes an adhered portion) to a front face side of a flexible outline sheet 1. In this case, a liquid permeable second sheet ~~11S-16~~ is interposed between the liquid permeable top sheet 11 and the absorbing element ~~AB41~~. In this case, for the purpose of increasing a fitting property around a hipline and preventing a body fluid from leaking out from a longitudinal direction, a waist elastic stretchable member 20 and a hipline elastic stretchable member 21 are provided, and in order to prevent body fluid from leaking out from a legline opening portion ~~L022~~, there is formed a rising cuff ~~B-51~~ (this rising cuff ~~B 51~~ is constituted by a rising portion ~~B1-52~~ and a flat surface contact portion ~~B253~~ as depicted in Figure 2). ~~for The rising~~

cuff 51 is disposed around a leg protruding to a front face side
by a rising sheet 40 continuously provided in a width direction
and elastic stretchable members 50 and 60. With reference to
Fig. 2, a riding end 54 is also shown.

The outline sheet 1 provided with the absorbent main body
10 is structured such that a front body side ~~F~~-23 and a back
body side ~~B~~-24 are folded around a crotch portion 4 in a
post-process of production, and both side edge portions 30 in
a longitudinal direction are adhered by means of an ultrasonic
sealing, a thermal welding or the like. Accordingly, a waistline
opening portion ~~DO~~-25 and a legline opening portion ~~LO~~-22 are
formed, whereby the pants type disposable paper diaper 100 is
completed (a completion drawing is not illustrated).

In this case, the outline sheet 1 is formed by laminating
two transparent to semitransparent laminated unwoven fabric
cloths or the like having an air permeability and a water
~~repellant~~repellancy. Further, since the top sheet 11 directly
touches with a skin of a wearer, the top sheet 11 preferably
employs an unwoven fabric ~~clothe~~leths, or a porous plastic sheet
or the like having a pleasant feel. The absorbent 13 may employ
any material as far as it can absorb and hold body fluid, in
general, ~~it preferably~~ The absorbent 13 employs a material in
which an absorbent main body is obtained by mixing an absorbable
polymer to a cotton-like pulp and the absorbent main body is
formed in a sandglass shape having a ~~certain degree of~~ thickness
and rigidity. The absorbing element ~~AB~~-41 is obtained by covering

an entire ~~of an~~ outer peripheral surface of the absorbent main body with a crepe paper 14 having a ~~flexibility~~ and a ~~liquid~~ permeability. The water vapor permeable waterproof sheet 15 mentioned below is provided together with the liquid impermeable back sheet 12 in such a manner as to cover both side portions of a surface wrapping from a back face to a front face side of the absorbing element AB41.

The back sheet 12 employs a sheet material having at least a water shielding property such as ~~the a~~ transparent to semitransparent polyethylene, polypropylene or the like, and additionally ~~it~~ employs a laminated unwoven fabric ~~cloths~~ cloth obtained by laminating the unwoven fabric ~~cloths~~ cloth on the polyethylene sheet or the like. Further, a filamentous elastic rubber constituted by a styrene family rubber, an olefin family rubber, ~~an a~~ urethane family rubber, a polyurethane, a polystyrene or the like is preferably ~~is~~ employed as a raw material of the elastic stretchable members 20, 21, 50 and 60 for the respective intended uses mentioned above.

A micro porous sheet or the like is preferably employed for the water vapor permeable waterproof sheet 15 used in the present paper diaper 100, from the point of view of preventing leakage of body fluid and a stuffy state. The microporous sheet is obtained by melting and kneading an inorganic filler into a material having water shielding property and water vapor permeability, for example, an olefin resin such as a polyethylene, a polypropylene or the like so as to form a sheet, and thereafter

centrifuging in a uniaxial or biaxial direction. Further, it is possible to employ a material obtained by directly coating an acryl resin, a polyurethane resin or the like on a base material such as an unwoven fabric cloths or the like.

In this case, in accordance with an experiment ~~by this inventor~~, taking into consideration amount of sweating of the wearer, a sheet material in which a water vapor permeability on the basis of JIS Z-0208 method of test is $700 \text{ g/m}^2/24\text{h}$ or more is preferable for the water vapor permeable waterproof sheet 15, and in order to keep a comfortable environment particularly after a violent movement or passing urine, a sheet material in which the water vapor permeability is $7000 \text{ g/m}^2/24\text{h}$ or more is most preferable.

In the present paper diaper 100, on an inner surface of the water vapor permeable waterproof sheet 15, a water content indicator 70 informing of an excretion of body fluid is provided at least near a center line of the absorbent 13 ~~in~~ within a range of being covered by the absorbent 13. The water content indicator 70 is shown by a black cross section in Figs. 2 and 3. The water content indicator 70 is constituted by a hydrophilic resin coating layer 71 and an information mark 72 provided on an inner surface of the hydrophilic resin coating layer 71, as shown in Fig. 4 by enlarging a cross section of a main portion (a portion shown by a dotted line circle R-61 in Figs. 2 and 3).

The hydrophilic resin coating layer 71 is formed by coating a coating liquid of hydrophilic resin, for example, CMC, PVA,

PEO, poly acrylic sodium or the like on an inner surface of the waterproof film 15 at a thickness of about 1 to 20 μ in accordance with a known coating system, for example, a gravure coater or the like. The hydrophilic resin mentioned above is further desirable such that a weather resistance is increased by adding to the hydrophilic resin coating layer 71 an ultraviolet ~~absorbents~~ absorbent such as those in the salicylic acid family, benzophenone family, benzotriazole family, cyanoacrylate family, or the like; an ultraviolet scattering agent such as zinc oxide, titanium oxide or the like; and/or a light stabilizer such as hindered amine family or the like, antioxidant such as ascorbic acid or the like ~~to the hydrophilic resin coating layer 71~~. In this case, if the layer thickness is too large, the portion, which is thick, ~~is undesirably~~ becomes undesirably hard and feels unpleasant.

The information mark 72 is formed by coating a known coating liquid for a water content indicator on the inner surface of the hydrophilic resin coating layer 71 at a thickness between 1 and 20 μ by a known coating machine in the same manner as mentioned above. The known coating liquid for water content indicator is constituted, for example, by an erasing ink colored from an achromatic color to a specific color of a coloration chemical compound on the basis of a molecular contact by one kind or more electron donating a coloration chemical compound selected from crystal violet lactone, malachite green lactone or the like with an electron accepting property developed color

chemical compound corresponding to organic acid or organic acid salt such as citric acid, itaconic acid, salicylic acid, zinc salicylate or the like, and decolored only by an attachment of the water, a water soluble ink using a food color such as a blue No. 1 or the like, or a hot melt adhesive agent composition formed so as to include an indicator such as promophenol blue, methyl red or the like discolored in response to a change of pH control component and pH. In this case, if the thickness of the information mark 72 is too small, it is hard to be viewed from the outer side. On the contrary, if the thickness is too large, the amount of the coating liquid is increased, and a manufacturing cost is increased. Accordingly, it is preferable to set the thickness in the range mentioned above.

Fig. 5 is a plan view showing a flat surface shape of the water content indicator 70 constituted by the hydrophilic resin coating layer 71 and the information mark 72.

As illustrated, the flat surface shape of the water content indicator 70 shows a state in which the information mark 72 is formed on the inner surface of the hydrophilic resin coating layer 71 ~~of~~ in a heart-shaped pattern arranged at even intervals in a longitudinal direction of the center portion of the water vapor permeable waterproof sheet 15 in such a manner as to be included within the heart-shaped pattern and have approximately the same shape. When viewing the water content indicator 70 structured as mentioned above from the outer side via the transparent to semitransparent back sheet 12 and the outline

sheet 1, it appears ~~such that~~ as though the design is applied to the present paper diaper 100, and there is an advantage that a beauty is given to the viewer.

Further, if the outer shape of the hydrophilic resin coating layer 71 is brought into line with the outer shape of the information mark 72 as mentioned above, it is possible to minimize ~~used~~ the required amount of the hydrophilic resin coating liquid forming the hydrophilic resin coating layer 71, whereby it is possible to reduce the manufacturing cost of the present paper diaper 100.

In this case, the information mark 72 is not limited to the heart-shaped pattern as mentioned above, but can be appropriately selected in correspondence to the purpose from the conventionally known various patterns, for example, a letter, mark, design, or a combination thereof or the like.

In accordance with the present paper diaper 100 provided with the water content indicator 70 as mentioned above, if the body fluid, for example, ~~the urine,~~ is excreted to the surface of the liquid permeable top sheet 11, urine is diffused and moved so as to be absorbed within the absorbing element AB41. However, at this time, if urine acts on the water content indicator 70 adjacent to the absorbing element AB41 although it is at a trace quantity, the information mark 72 is immediately discolored ~~to~~ or decolored in response to the water content included in this urine. Accordingly, the user can immediately recognize the change of the information mark 72 from the outer side via the

transparent to semitransparent back sheet 12 and the outline sheet 1.

In this case, in accordance with an experiment ~~by this inventor~~, it is confirmed that the water content indicator 70 is reacted and discolored for within a short time, for example within ten second, with respect in response to an extremely small amount of urine, for example, 10 cc urine. In this case, the water content indicator 70 is provided in the present paper diaper 100 having the absorbent 13 formed by uniformly mixing the pulp and the SAP in such a manner that respective weights come to 200 g/m² and 150 g/m².

Further, as mentioned above, since the hydrophilic resin coating layer 71 constituting the water content indicator 70 has an excellent property in terms of the moisture resistance, the water content indicator 70 is neither reacted nor discolored even if the present paper diaper 100 is exposed to the outside air over the long term, and it is possible to maintain the function long.

Further, in the present paper diaper 100, since the water vapor permeable waterproof sheet 15 employs the sheet material having the excellent water vapor permeability in which the water vapor permeability on the basis of JIS Z-0208 method of test is 700 g/m²/24h or more, most preferably 7000 g/m²/24h or more, the stuffy state is not generated in the crotch portion even if the wearer wears it for a long time. Further, since it feels pleasant, it is possible to apply the comfortable feeling to

the wearer.

In this case, the present paper diaper 100 in accordance with the first embodiment of this invention described above is provided with the second sheet ~~11S~~16 and the outline sheet 1, however, these sheet members are not always necessary, but can be omitted in accordance with configuration, purpose, application or the like of the absorbent article.

Further, as the system for forming the hydrophilic resin coating layer on the inner surface of the water vapor permeable waterproof sheet, or the system for forming the information mark on the inner surface of the hydrophilic resin coating layer, it is possible to employ in addition to the gravure printing, an offline printing system, for example, flexographic printing or the like, or an inline printing system on the basis of ink jet, hot melt or the like.

Fig. 6 shows a main portion of a second embodiment in accordance with this invention, and in particular, it is a plan view of a water content indicator ~~70A~~76 in accordance with a modified embodiment of the water content indicator 70 provided in the present paper diaper 100.

As illustrated, the water content indicator ~~70A~~76 is structured such that the hydrophilic resin coating layer 71 is formed in a rectangular shape over an approximately entire surface of the water vapor permeable waterproof sheet 15, and the information marks 72 having the same shape and thickness as mentioned above are provided in the inner surface thereof.

In the case that the hydrophilic resin coating layer 71 is set wider as mentioned above, and the information mark 72 is provided on the hydrophilic resin coating layer 71, it is possible to obtain the same effect as mentioned above, apart from cost problems, and there can be also obtained an advantage that marks of various forms can be set in large numbers.

In the same way, Fig. 7 shows a main portion of a third embodiment in accordance with this invention, and in particular, it is a plan view of a water content indicator ~~70B~~77 in accordance with a modified embodiment of the water content indicator ~~70A~~76, and Fig. 8 is a sectional view taken along the line ~~Z-ZIII~~III-III of Fig. 7.

As illustrated, the water content indicator ~~70B~~77 is ~~common-similar~~ to the water content indicator ~~76~~70A ~~in the point of~~ in regards to the structure constituted by the hydrophilic resin coating layer 71 and the information mark 72 having the same shape and thickness, however, as shown in Fig. 8, it is different from the water content indicator ~~76~~70A ~~in point of~~ in regards to the printed surfaces ~~73a~~73, ~~73b~~74 and ~~73c~~75 which are provided between the water vapor permeable waterproof sheet 15 and the hydrophilic resin coating layer 71 at positions corresponding to the arranged positions of the respective information marks 72 by a general ink, that is, an ink which is not discolored even if it is brought into contact with the water content by the same printing system mentioned above. These printed surfaces ~~73a~~73, ~~73b~~74 and ~~73c~~75 are formed by the

same color ink ~~to~~or different color inks each relative to each other. In this case, since a capability of the ink is lowered if different inks are mixed, the mixed ink is not preferable.

Further, in this embodiment, a flat surface shape of the printed surfaces ~~73a~~73, ~~73b~~74 and ~~73c~~75 are mark of star-shaped, however, the mark can be optionally changed as mentioned above.

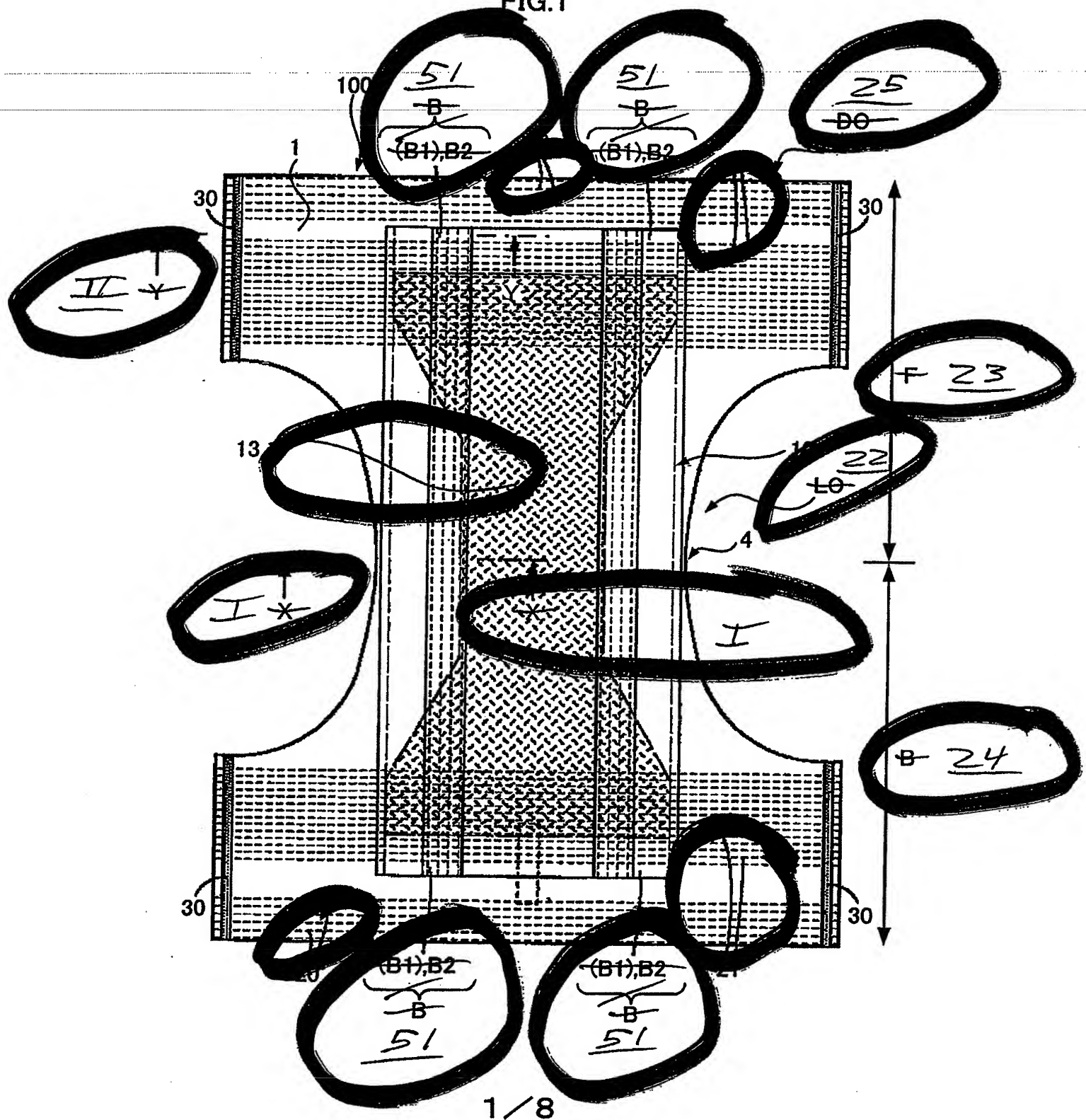
In accordance with the water content indicator ~~70B~~77 mentioned above, ~~in spite that~~although each of the information marks 72 is discolored ~~to~~by being decolored if the excreted urine is brought into contact with the water content indicator ~~70B~~77, the printed surfaces ~~73a~~73, ~~73b~~74 and ~~73c~~75 are not changed. Accordingly, in the case of viewing from the outer side, only the printed surfaces ~~73a~~73, ~~73b~~74 and ~~73c~~75 remain, and the pattern of the print appears to be changed between after and before passing urine, whereby it is possible to instantaneously and securely inform the user of the excretion.

~~Industrial Applicability~~

~~It~~With respect to industrial applicability, for example, it goes without saying that this invention is not limited to the pants type disposable paper diaper, but can be widely applied to the other absorbent articles such as the sanitary napkin, the urine remaining pad and the like in addition to a tape type disposable paper diaper.

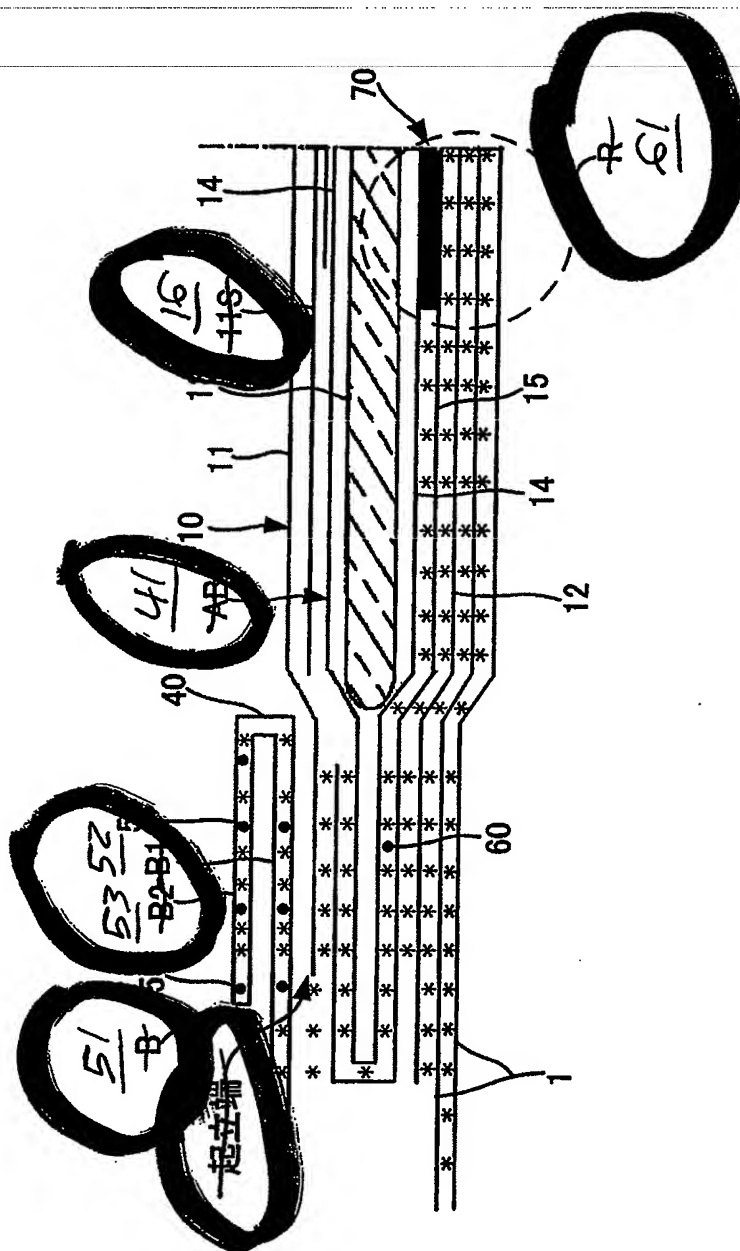
Annotated Sheet

FIG. 1



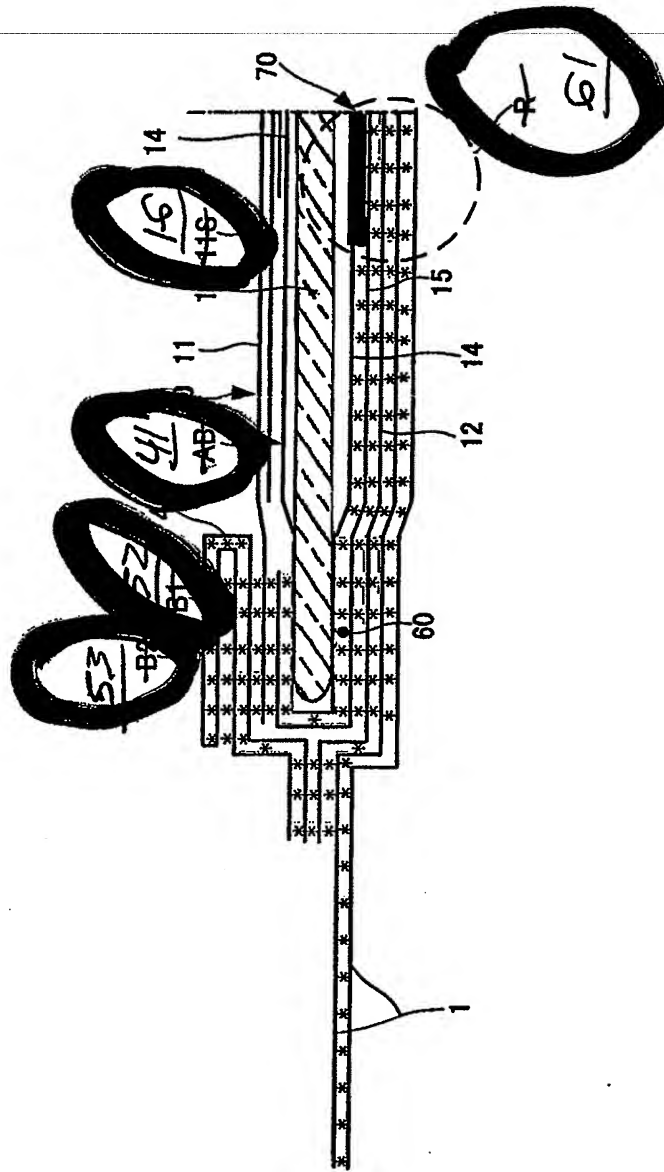
Annotated Sheet

FIG.2



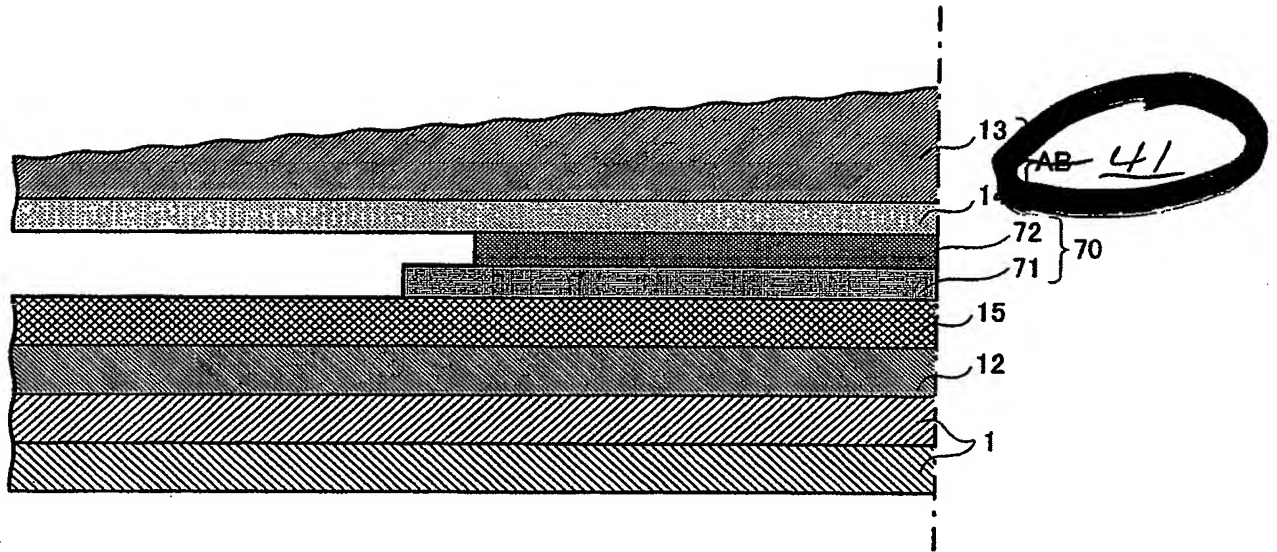
Annotated Sheet

FIG.3



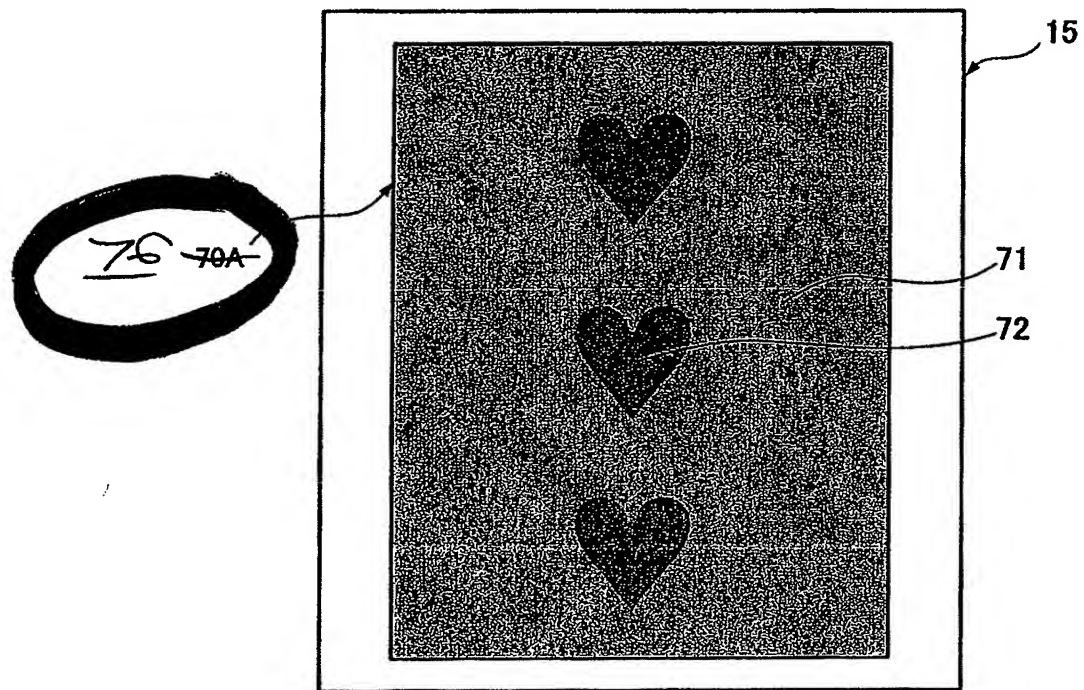
Annotated Sheet

FIG.4



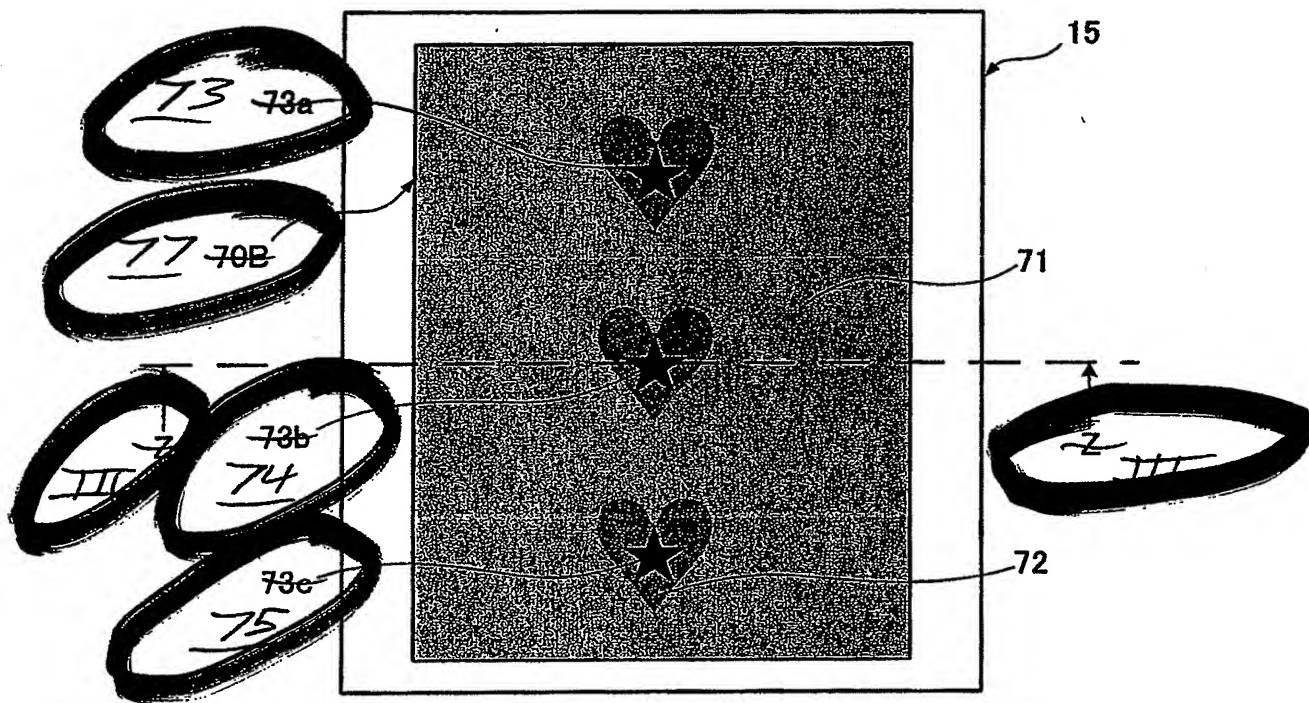
Annotated Sheet

FIG.6



Annotated Sheet

FIG. 7



Annotated Sheet

FIG.8

